as second probability-based calling patterns that covers a second time period. --

REMARKS

Claims 1, 19, 21, and 26 have been cancelled. Claims 2-18, 20, and 22-25 have been amended. New claims 27-30 have been added. No new matter has been added.

Claims 2-18, 20, 22-25, and 27-30 are currently pending in the present application. Reexamination and reconsideration of the application, as amended, are respectfully requested.

REJECTION OF CLAIMS UNDER 35 U.S.C. 112

Claims 4-13 and 25 are rejected under 35 U.S.C. 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention for the reasons set forth on pages 2 and 3 of the Action.

Claims 4-13 and 25 have been amended to address any indefinite problems. For example, claims 6-8 and 11-13 have been amended to refer to claim 2, which sets forth the sufficient antecedent basis for the following limitations: "updated profile cube," "snapshot cube," "updated profile cube," "profile table," and "call table." Similarly, claim 25 has been amended to refer to claim 22,

which sets forth the sufficient antecedent basis for "dimensions."

Accordingly, it is respectfully submitted that claims 4-13 and 25, as amended, now fully comply with the requirements of 35 U.S.C 112.

REJECTION OF CLAIMS 1-26 UNDER 35 U.S.C. 103(a)

Claims 1-26 are rejected under 35 U.S.C. 103(a) as being unpatentable for the reasons set forth on pages 4 through 14 of the Action. Specifically, claims 1-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiawei Han ("Towards On-Line Analytical Mining in Large Databases", hereinafter the Han reference) in view of Tuzhilin, US 6,236,978 (hereinafter Tuzhilin).

Applicant respectfully traverses the rejections to the claims, at least insofar as applied to the amended claims and new claims, and requests reconsideration and reexamination of the application for the reasons that follow.

Han and Tuzhilin References

On page 4 of the Action states that FIG. 1 and page 3, paragraph 4 of the Han reference teaches a data processing system having a data warehouse and an OLAP server that generates data cubes.

The Action further states that the Han reference does not teach generating a customer behavior pattern.

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However, the Action states the Tuzhilin reference teaches a method for profiling customer behavior and generating a customer behavior patter. The Action concludes that it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have modified the Han reference to include: generating customer behavior.

Applicant respectfully disagrees with the Action's position. It is respectfully submitted that the Han reference, whether alone or in combination with the Tuzhilin reference, fails to teach or suggest the telecommunication fraud detection method and system, as claimed.

Cited References Fail to Identify Problem

The references, whether alone or in combination, fail to teach or suggest a method or system for detecting telecommunication fraud as claimed. As set forth in the Background of the patent application, there are significant barriers and problems with prior art approaches in the analysis of telephone call records to identify or to detect telecommunication fraud. The references fail to define or even identify these problems. Furthermore, the references do not offer any solutions to these problems.

Moreover, the references, whether alone or in combination, fail to teach or suggest the specific steps or elements recited in the claims as described in greater detail hereinafter.

Method Claims

For example, with reference to new claim 27, the references, whether alone or in combination, fail to teach or suggest the step of "retrieving a plurality of call records from the data warehouse," as claimed. Furthermore, the references, whether alone or in combination, fail to teach or suggest the step of "generating a calling profile cube based on the call records; wherein the calling profile cube includes information on multiple customers," as claimed.

Moreover, the references, whether alone or in combination, fail to teach or suggest the step of "generating a volume-based calling pattern cube for each individual customer based on the multi-customer calling profile cube," as claimed. Additionally, the references, whether alone or in combination, fail to teach or suggest the step of "comparing the volume-based calling pattern cube for each customer to a predetermined fraudulent volume-based calling pattern," as claimed. Furthermore, the references, whether alone or in combination, fail to teach or suggest the step of "when the volume-based

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calling pattern cube is in a first predetermined relationship with predetermined fraudulent volume-based calling pattern, performing a first action," as claimed.

For example, with reference to new claim 28, the references, whether alone or in combination, fail to teach or suggest the step of "retrieving a plurality of call records from the data warehouse," as claimed.

Furthermore, the references, whether alone or in combination, fail to teach or suggest the step of "generating a calling profile cube based on the call records; wherein the calling profile cube includes information on multiple customers," as claimed.

Moreover, the references, whether alone or in combination, fail to teach or suggest the step of "generating a volume-based calling pattern cube for each individual customer based on the multi-customer calling profile cube," as claimed.

Additionally, the references, whether alone or in combination, fail to teach or suggest the step of "generating a probability-based calling pattern cube based on the volume-based calling pattern cube for each individual customer," and the step of "comparing the probability-based calling pattern cube for each customer to a predetermined fraudulent probability-based calling pattern," as claimed.

Furthermore, the references, whether alone or in combination, fail to teach or suggest the step of when the probability-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent probability-based calling pattern, performing a first action," as claimed.
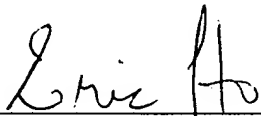

System Claims

With respect to amended independent claim 14, the references, whether alone or in combination, fail to teach or suggest "a profile engine, coupled to the data warehouse for computing, maintaining and utilizing caller pattern cubes that represent caller profiles; wherein the caller pattern cubes can be utilized to detect telecommunication fraud," as claimed. Furthermore, the cited references fail to teach or suggest the specific elements recited in the claims depending upon independent claim 14. For example, the fraud detection module recited in claim 15, the analysis tool recited in claim 16, the visualization tool recited in claim 17, the data staging tool recited in claim 18, and the use of OLAP programming to provide a scalable computation engine recited in claim 20 are not taught or suggested by the Han reference, whether alone, or in combination with the Tuzhilin reference.

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Accordingly, it is respectfully submitted that the Han reference, whether alone or in combination with the Tuzhilin reference, fails to teach or suggest the telecommunication fraud detection method and system, as claimed.

In view of the foregoing, it is respectfully submitted that all pending claims of the present invention are now in condition for allowance. Reexamination and reconsideration of the pending claims are requested and allowance at an early date solicited. The Examiner is invited to telephone the undersigned if he has any suggestions, thoughts or comments, which might expedite the prosecution of this case.
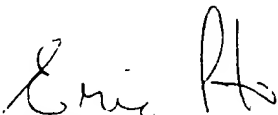
Respectfully submitted,

_____
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Dated: August 12, 2002
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on the date below.

_____   August 12, 2002
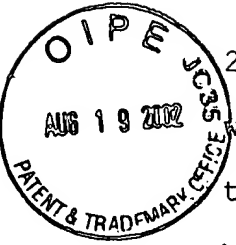Eric Ho (RN 39,711)   (Date)

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2.   A method as in claim [1] 27 wherein said data warehouse has a call table and a profile table, wherein the step of generating a [customer] calling profile cube based on the records further comprises the steps of:

      retrieving records from the call table and based thereon generating a snapshot cube representing the records from the call table, said snapshot cube having predetermined dimensions;

      retrieving records from the profile table and based thereon generating a profile cube representing the records from the profile table, said profile cube having predetermined dimensions that are the same as the dimensions of the snapshot cube;

      merging the snapshot cube and the profile cube to generate an updated profile cube; and

deriving the [customer] volume-based calling pattern cubes based on the updated profile cube.

3.   A method as in claim [2 further comprising: comparing the customer calling pattern with a known fraudulent pattern, if there is a match, then automatically generating an alert] 27 wherein the step of when the volume-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent volume-based calling pattern, performing a first action includes one of:

      flagging a particular caller with the volume-based calling pattern being analyzed as suspicious;

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automatically generating an alert that specifies

    callers with suspicious volume-based calling

    pattern;

performing further investigation on callers with

    suspicious volume-based calling pattern;

cancellation of telephone services for callers with

    suspicious volume-based calling pattern; and

performing other appropriate remedial actions.

4.   A method as in claim [1] 27 further comprising:

    analyzing the [call] calling pattern cube by

        utilizing at least one OLAP operation.

6.   A method as in claim [1] 2 wherein the predetermined

fraudulent volume-based calling pattern in one of a

personalized calling pattern and a group-based pattern.

7.   A method as in claim [1] 2 further comprising:

    storing the updated profile cube into the profile

        table in the data warehouse; and

    performing data staging between the profile table and

        the updated profile cube at predetermined time

        intervals.

8.   A method as in claim [1] 2 wherein said profile cube,

snapshot cube, and updated profile cube each includes at

least two dimensions and at least two levels.

9.   A method as in claim 8 further comprising:

analyzing the [call] calling pattern cube by

utilizing at least one OLAP operation along more

than one level.

10.   A method as in claim 8 further comprising:

analyzing the [call] calling pattern cube by

utilizing at least one OLAP operation along more

than one dimension.

11.   A method as in claim [1] 2 wherein the profile cube,

snapshot cube, and the updated profile cube each are

multi-level and multi-dimensional cubes.

12.   A method as in claim [1] 2 wherein the profile table

and the call table each has a plurality of attributes, and

the profile cube and snapshot cube each has a plurality of

dimensions, said attributes corresponding in a one-to-one

fashion to the dimensions.

13.   A method as in claim [1] 2 wherein the profile cube

includes at least one cell having probability based

values.

14.   A data processing system comprising:

a data warehouse for storing data in a relational

format, said data warehouse including a profile

table and a call table;

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an OLAP server, coupled to the data warehouse, for providing predetermined OLAP operations; and

a profile engine, coupled to the data warehouse [for generating a profile cube from information selected from the profile table, generating a snapshot cube, updating the profile cube by merging the profile cube and the snapshot cube to generate an updated profile cube, and deriving a calling pattern cube based on the updated profile cube] for computing, maintaining and utilizing caller pattern cubes that represent caller profiles; wherein the caller pattern cubes can be utilized to detect telecommunication fraud.

15. A data processing system as in claim 14 further comprising:

a fraud detection module for [determining whether a reporting tool for use by a data analyst to generate a report having selected parameters based on the calling pattern cube] detecting telecommunication fraud by comparing known fraudulent profiles to caller pattern cubes;

the profile engine further generating a profile cube from information selected from the profile table, generating a snapshot cube, updating the profile cube by merging the profile cube and the snapshot cube to generate an updated profile

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cube, and deriving a calling pattern cube based
on the updated profile cube; wherein the profile
engine is a scalable computation engine that is
implemented by OLAP programming supported by the
OLAP server.

16. A data processing system as in claim 14 further
comprising:

an analysis tool for use by a data analyst to
[compare the calling pattern cube to known
fraudulent calling pattern cube] perform one of
comparing the calling pattern cube to known
fraudulent calling pattern cube and extracting
information from the calling pattern cube based
on selected dimensions, levels, and ad-hoc
queries provided by the data analyst.

17. A data processing system as in claim 14 further
comprising:

a visualization tool for use by a data analyst to
display the calling pattern cube in different
formats, levels, and dimensions.

18. A data processing system as in claim 14 further
comprising:

a data staging tool for transferring data between the
profile cube stored in the OLAP server and

profile table in the data warehouse at

predetermined time intervals.

20. A method as in claim [1] 27 further comprising:

utilizing an OLAP server to create [profiles] a

calling profile cube, [update profiles] updated

calling profile cubes, derive calling [patterns]

pattern cubes from the [profiles] calling

profile cube, analyzing calling [patterns]

pattern cubes, and comparing calling [patterns]

pattern cubes;

[representing profiles and derived patterns as multi-

dimensional and multi-level data cubes;

utilizing an OLAP server as a scalable computation

engine;

representing customer profiles as volume cubes; and

wherein the derived patterns are based on probability

distributions, wherein patterns covering

different intervals can be compared;]

wherein OLAP programming supported by the OLAP server

provides a scalable computation engine for

generating and processing the calling pattern

cubes.

22. The method of claim [21] 28 wherein the calling

profile [data cubes are] cube is a multi-dimensional and a

multi-level [cubes] cube and wherein the volume-based

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calling pattern cubes are multi-dimensional and a multi-level cubes.

23. The method of claim [21] <u>28</u> further comprising:

performing data staging at predetermined time intervals; and

updating the calling profile cube by generating a snapshot cube from a call table; and

merging the snapshot cube with the calling profile cube to generate an updated calling profile cube.

24. The method of claim [21] <u>28</u> wherein the <u>calling</u> profile [data] cube has a cell that includes a probability distribution value based on one of the probability distribution on calls to each callee and the probability distribution on all calls.

25. The method of claim [21] <u>22</u> wherein the dimensions include a day-of-week hierarchy, a time hierarchy, and a duration hierarchy.